

PATENT ABSTRACTS OF JAPAN

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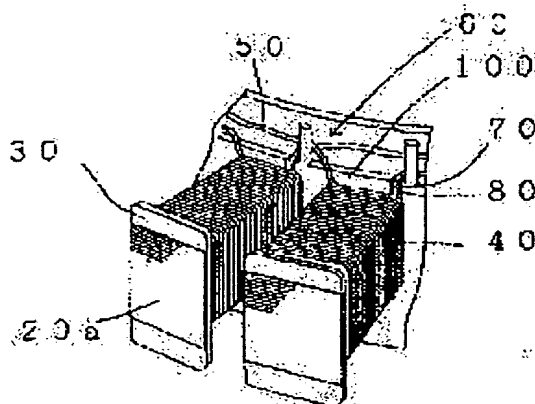
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(54) STATOR OF MOTOR

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a highly reliable wiring method of coil terminal at a low cost, by applying a simple device to the configuration of a coating member part of the stator iron core covered with an insulating resin coating member, and to provide a wiring method of coil terminal.

SOLUTION: A sidewall 100 of a crossover wire housing part 60 is provided with a coil terminal housing slot 80 for housing a winding-start terminal 70 or a notch 90 for guiding a coil terminal, so that the winding-start terminal is prevented from contacting the electric wire at the second turn or later. Thus, the insulating coat of electric wire is not broken by mechanical contact at winding or vibration during operation.



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CLAIMS

[Claim(s)]

[Claim 1] The stator core which consists of the circular ring-like iron core York section and an iron core tooth part which protruded in the direction of a path from the iron core York section, The covering member made of insulating resin which covers the front face of a stator core and forms the insulating layer between a coil and an iron core, In the stator of the motor equipped with the crossover stowage extended to the coil wound around each iron core tooth part from on this covering member, and the circumferencial direction by which it is prepared in rotator shaft-orientations 1 end face of said covering member, and the crossover of a coil is contained The stator of the motor characterized by establishing the coil terminal receipt slot which contains the coil terminal of the cut water of a coil in the front face of the coil side side attachment wall of said crossover stowage [claim 2] The stator of the motor according to claim 1 with which the shaft-orientations die length of said coil terminal receipt slot is characterized by being extended to the attachment section of an iron core tooth part at least from the location which introduces a coil terminal from a crossover stowage [claim 3] The stator core which consists of the circular ring-like iron core York section and an iron core tooth part which protruded in the direction of a path from the iron core York section, The covering member made of insulating resin which covers the front face of a stator core and forms the insulating layer between a coil and an iron core, In the stator of the motor equipped with the crossover stowage extended to the coil wound around each iron core tooth part from on this covering member, and the circumferencial direction by which it is prepared in rotator shaft-orientations 1 end face of said covering member, and the crossover of a coil is contained The stator of the motor with which it is the notch which introduces the coil terminal of the cut water of a coil into the coil side side attachment wall of said crossover stowage, and the depth is characterized by preparing a certain notch to the attachment section of an iron core tooth part at least

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the stator of a motor which has the stator core covered by the covering member made of insulating resin, and the coil wound on it.

[0002]

[Description of the Prior Art] In the conventional motor, as shown in drawing 8, the coil terminal by the side of the cut water introduced via a crossover stowage to the coil of each phase was directly wired on the front face of the coil side side attachment wall of a crossover stowage, and had become the configuration which is wound around the iron core tooth part covered by the covering member as it was, and forms a coil.

[0003]

[Problem(s) to be Solved by the Invention] However, it sets to such a conventional approach. Since the electric wire after 2 turn eye serves as a form wound on the coil terminal of the cut water on the front face of a covering member in the range which is before the iron core tooth part attachment section, and starts the volume thickness of a coil from the location where a coil terminal is introduced from a crossover stowage, There was a possibility of covering of an electric wire having been broken by vibration at the time of the mechanical contact at the time of a coil and operation etc., and producing dielectric breakdown by the applied voltage between coils. This invention offers the wiring approach of a coil terminal with high insulating dependability by adding the easy device for the wiring approach of the coil terminal of the configuration of the covering member section, and a stator winding.

[0004]

[Means for Solving the Problem] The stator core where the stator of a motor according to claim 1 consists of the circular ring-like iron core York section and an iron core tooth part which protruded in the direction of a path from the iron core York section, The covering member made of insulating resin which covers the front face of a stator core and forms the insulating layer between a coil and an iron core, In the stator of the motor equipped with the crossover stowage extended to the coil wound around each iron core tooth part from on this covering member, and the circumferencial direction by which it is prepared in rotator shaft-orientations 1 end face of said covering member, and the crossover of a coil is contained Suppose that it is characterized by establishing the coil terminal receipt slot which contains the coil terminal of the cut water of a coil in the front face of the coil side side attachment wall of said crossover stowage.

[0005] Since according to the above-mentioned means the coil terminal of the cut water wired first is contained by the coil terminal receipt slot and wired in it, the electric wire after 2 turn eye becomes possible [winding without contacting the coil terminal of a cut water directly], and its a possibility that pre-insulation of an electric wire may be broken by vibration at the time of the mechanical contact and operation at the time of a coil etc. disappears.

[0006] The stator of a motor according to claim 2 is characterized by being extended to the attachment section of an iron core tooth part at least from the location where the shaft-orientations die length of said coil terminal receipt slot introduces a coil terminal from a crossover stowage.

[0007] Since according to the above-mentioned means the coil terminal of a cut water is contained by the coil terminal receipt slot and wired in it in all the range of from the location which introduces a coil terminal before the iron core tooth part attachment section not only from the range concerning the volume thickness of a coil but from a crossover stowage, it becomes possible to remove completely a possibility that pre-insulation of an electric wire may be broken by mechanical contact at the time of a coil etc. not to mention the time of operation.

[0008] The stator core where the stator of a motor according to claim 3 consists of the circular ring-like iron core York section and an iron core tooth part which protruded in the direction of a path from the iron core York section, The covering member made of insulating resin which covers the front face of a stator core and forms the insulating layer between a coil and an iron core, In the stator of the motor equipped with the crossover stowage extended to the coil wound around each iron core tooth part from on this covering member, and the circumferencial direction by which it is prepared in rotator shaft-orientations 1 end face of said covering

member, and the crossover of a coil is contained It is the notch which introduces the coil terminal of the cut water of a coil into the coil side side attachment wall of said crossover stowage, and the depth is characterized by preparing a certain notch to the attachment section of an iron core tooth part at least.

[0009] Since the coil terminal of the cut water wired first is introduced from the notch into which the coil terminal of the cut water of a coil is introduced according to the above-mentioned means, the electric wire after 2 turn eye It becomes possible to wind without contacting the coil terminal of a cut water directly, and a possibility that pre-insulation of an electric wire may be broken by claims 1 and 2 like the means of a publication by vibration at the time of the mechanical contact and operation at the time of a coil etc. disappears.

[0010]

[Embodiment of the Invention] Hereafter, the example of this invention is explained to a detail based on drawing 1 thru/or drawing 7 . In addition, in an example, although the example which applied this invention to the stator of an outer rotor form direct-current brushless motor is shown, it cannot be overemphasized that it can apply to other motors of a configuration with which it is not limited to this and the concentration volume of the coil is carried out to an iron core tooth part.

[0011] The top view showing the whole stator 10 configuration of this outer rotor form brushless motor is shown in drawing 5 . In this example, it is the configuration of a three phase circuit, 36 slots, and 24 poles, and does not illustrate, but there is a rotator arranged in the permanent magnet of 24 poles by the sense which counters a stator 10 in the periphery of a stator 10, it becomes a stator 10 and a pair, and the outer rotor form brushless motor is constituted.

[0012] As shown in drawing 6 which is the A-A sectional view of drawing 5 and drawing 5 , from circular ring-like iron core York section 20b and iron core York section 20b, a stator core consists of iron core tooth part 20a which protruded on the method of the outside of the direction of a path, carries out the laminating of the sheet metal of the silicon steel sheet by which blanking was carried out, and is formed. Furthermore, the stator core has mostly structure except the peripheral face of iron core tooth part 20a covered with the covering member 30 made of insulating resin formed of insertion molding in the whole surface.

[0013] In the case of this example, the three-phase-circuit coil of U, V, and W is divided into 12 sets, respectively, and is wound around each iron core tooth part 20a from on this covering member 30, they are connected to a serial by the crossover 50, and the coil 40 constitutes the whole three-phase-circuit coil.

[0014] Drawing 1 is the perspective view showing the important section of the 1st example of this invention. Drawing 2 is drawing showing the condition before the coil mounting. In the case of this example, as shown in drawing, the crossover stowage 60 which is the groove tooth space of a circumferential direction is located to the tooth space by the side of a coil bore, and the crossover 50 of each phase results [be / it / under / of this crossover stowage 60 / course] to the coil of the following group. Although the crossover 50 which has gone via the crossover stowage 60 is introduced as a coil terminal 70 from the coil side side attachment wall 100 of a crossover stowage as shown in drawing The coil terminal receipt slot 80 is established in the front face of the side attachment wall 100 of a before [the iron core tooth part attachment section which hits the protrusion base from the introductory location to iron core York 20b of iron core tooth part 20a]. The coil terminal 70 is wired in the inside of this coil receipt slot 80, results in iron core tooth part 20a, then, is wound on the covering member of iron core tooth part 20a, and forms a coil 40. Thus, since the coil terminal 70 of a cut water is contained and is wired into the coil terminal receipt slot 80, the electric wire after 2 turn eye becomes possible [winding without contacting the coil terminal 70 of a cut water directly], and its a possibility that pre-insulation of an electric wire may be broken by vibration at the time of the mechanical contact and operation at the time of a coil etc. disappears.

[0015] In addition, in the case of this example, the cross section of the coil terminal receipt slot 80 shows the thing of a rectangle configuration, but this cross-section configuration will not ask a configuration, if electric wires, such as a hemicycle and an elliptic type, can be held. Moreover, it is desirable for the flute width of this receipt slot to be about 1.2 to 5 times of the electric-

wire width of face of a coil terminal, and for a channel depth to be about 1.2 to 2 times of the electric-wire thickness of a coil terminal.

[0016] Drawing 3 is the perspective view showing the important section of the 2nd example of this invention. Drawing 3 is drawing showing the condition before the coil mounting. Although the crossover 50 which has gone via the crossover stowage 60 is introduced as a coil terminal 70 from the coil side side attachment wall 100 of a crossover stowage as shown in drawing On the coil side side attachment wall 100 of this crossover stowage Since a certain notch 90 is formed for the notching depth to the attachment section of iron core tooth part 20a at least, the coil terminal 70 results [from the crossover stowage 60] in the direct iron core tooth part attachment section through this notch 90, is wound on the covering member of iron core tooth part 20a, and a coil 40 is formed. Thus, since the coil terminal 70 of a cut water is introduced from a notch 90, the electric wire after 2 turn eye becomes possible [winding without contacting the coil terminal 70 of a cut water directly], and its a possibility that pre-insulation of an electric wire may be broken by vibration at the time of the mechanical contact and operation at the time of a coil etc. disappears.

[0017] In addition, as for the notch width of face of this notch, it is desirable that they are about 1.2 to 5 times of the electric-wire width of face of a coil terminal.

[0018]

[Effect of the Invention] As mentioned above, since it becomes possible to wind the electric wire after 2 turn eye according to this invention, without contacting the coil terminal of the cut water of a coil by adding the easy device for the configuration of the covering member section of a stator core and the wiring approach of a coil terminal which were covered by the covering member made of insulating resin, moreover, the stator of a motor with high insulating dependability can be offered by the low price.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The perspective view showing the important section of the 1st example of this invention

[Drawing 2] The perspective view showing the important section of the 1st example of this invention (before coil mounting)

[Drawing 3] The perspective view showing the important section of the 2nd example of this invention

[Drawing 4] The perspective view showing the important section of the 2nd example of this invention (before coil mounting)

[Drawing 5] The top view of the stator of the direct-current brushless motor in this invention

[Drawing 6] The A-A sectional view of drawing 5

[Drawing 7] The partial plan of the stator before coil mounting in the 1st example of this invention

[Drawing 8] The perspective view showing the wiring configuration of the coil terminal in a Prior art

[Description of Notations]

10: Stator

20a: Iron core tooth part

20b: Iron core York section

30: The covering member made of insulating resin

40: Coil

50: Crossover

60: Crossover stowage

70: Coil terminal

80: Coil terminal receipt slot

90: The notch which introduces a coil terminal

100: The coil side side attachment wall of a crossover stowage

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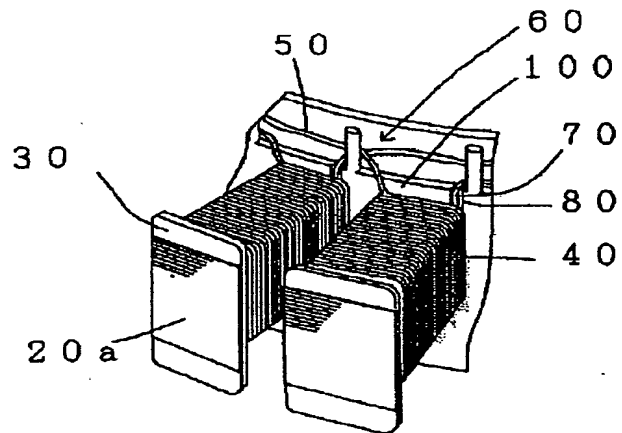
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(54) 【発明の名称】 電動機の固定子

(57) 【要約】

【課題】 本発明は、絶縁樹脂製の被覆部材で覆われた固定子鉄心の被覆部材部の構成と巻線端末の配線方法に簡単な工夫を加えることによって、低価格でしかも絶縁信頼性の高い巻線端末の配線方法を提供する。

【解決手段】 渡り線収納部60の側壁100にコイルの巻き始めの巻線端末70を収納するための巻線端末収納溝80若しくは巻線端末導入のための切欠き90を設けることによって、巻き初めの巻線端末と2ターン目以降の電線との接触を防止し、巻線時の機械的な接触や運転時の振動などによって電線の絶縁被覆が破られたりする恐れを無くする。



【特許請求の範囲】

【請求項 1】円環状の鉄心ヨーク部と鉄心ヨーク部から径方向に複数個突設された鉄心歯部とからなる固定子鉄心と、固定子鉄心の表面を覆いコイルと鉄心の間の絶縁層を形成する絶縁樹脂製の被覆部材と、この被覆部材の上から各鉄心歯部に巻回されるコイルと、前記被覆部材の回転子軸方向 1 端面に設けられ、コイルの渡り線が収納される円周方向に伸びた渡り線収納部とを備えた電動機の固定子において、前記渡り線収納部のコイル側側壁の表面に、コイルの巻き始めの巻線端末を収納する巻線端末収納溝が設けられていることを特徴とする電動機の固定子

【請求項 2】前記巻線端末収納溝の軸方向長さが、渡り線収納部より巻線端末を導入する位置から、少なくとも鉄心歯部の取付部まで伸びていることを特徴とする請求項 1 記載の電動機の固定子

【請求項 3】円環状の鉄心ヨーク部と鉄心ヨーク部から径方向に複数個突設された鉄心歯部とからなる固定子鉄心と、固定子鉄心の表面を覆いコイルと鉄心の間の絶縁層を形成する絶縁樹脂製の被覆部材と、この被覆部材の上から各鉄心歯部に巻回されるコイルと、前記被覆部材の回転子軸方向 1 端面に設けられ、コイルの渡り線が収納される円周方向に伸びた渡り線収納部とを備えた電動機の固定子において、前記渡り線収納部のコイル側側壁に、コイルの巻き始めの巻線端末を導入する切欠きであってその深さが少なくとも鉄心歯部の取付部まである切欠きが設けられていることを特徴とする電動機の固定子

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、絶縁樹脂製の被覆部材で覆われた固定子鉄心とその上に巻回されたコイルを有する電動機の固定子に関する。

【0002】

【従来の技術】従来の電動機では、図 8 に示すように、渡り線収納部を経由して各相のコイルへ導入される巻き始め側の巻線端末は、渡り線収納部のコイル側側壁の表面に直接配線され、そのまま被覆部材で覆われた鉄心歯部に巻回されてコイルを形成する構成になっていた。

【0003】

【発明が解決しようとする課題】しかしながら、このような従来の方法においては、渡り線収納部より巻線端末を導入する位置より鉄心歯部取付部までの間であってコイルの巻厚に係る範囲において、2 ターン目以降の電線が、被覆部材の表面上にある巻き始めの巻線端末の上に巻回される形となるため、巻線時の機械的な接触、運転時の振動などにより電線の被覆が破られコイル間の印加電圧による絶縁破壊を生じる恐れがあった。本発明は、被覆部材部の構成と固定子巻線の巻線端末の配線方法に簡単な工夫を加えることにより、絶縁信頼性の高い巻線端末の配線方法を提供するものである。

【0004】

【課題を解決するための手段】請求項 1 記載の電動機の固定子は、円環状の鉄心ヨーク部と鉄心ヨーク部から径方向に複数個突設された鉄心歯部とからなる固定子鉄心と、固定子鉄心の表面を覆いコイルと鉄心の間の絶縁層を形成する絶縁樹脂製の被覆部材と、この被覆部材の上から各鉄心歯部に巻回されるコイルと、前記被覆部材の回転子軸方向 1 端面に設けられ、コイルの渡り線が収納される円周方向に伸びた渡り線収納部とを備えた電動機の固定子において、前記渡り線収納部のコイル側側壁の表面に、コイルの巻き始めの巻線端末を収納する巻線端末収納溝が設けられていることを特徴とする。

【0005】上記手段によれば、最初に配線せられる巻き始めの巻線端末が、巻線端末収納溝に収納されて配線されるので、2 ターン目以降の電線は、巻き始めの巻線端末に直接接触することなく巻回することが可能となり、巻線時の機械的な接触や運転時の振動などにより、電線の絶縁被覆が破られたりする恐れがなくなる。

【0006】請求項 2 記載の電動機の固定子は、前記巻線端末収納溝の軸方向長さが、渡り線収納部より巻線端末を導入する位置から、少なくとも鉄心歯部の取付部まで伸びていることを特徴とする。

【0007】上記手段によれば、コイルの巻厚に係る範囲のみでなく、渡り線収納部より巻線端末を導入する位置から鉄心歯部取付部までの間の全ての範囲において、巻き始めの巻線端末が巻線端末収納溝に収納されて配線されるため、運転時はもちろんのこと、巻線時の機械的な接触などにより電線の絶縁被覆が破られたりする恐れを完全に除くことが可能となる。

【0008】請求項 3 記載の電動機の固定子は、円環状の鉄心ヨーク部と鉄心ヨーク部から径方向に複数個突設された鉄心歯部とからなる固定子鉄心と、固定子鉄心の表面を覆いコイルと鉄心の間の絶縁層を形成する絶縁樹脂製の被覆部材と、この被覆部材の上から各鉄心歯部に巻回されるコイルと、前記被覆部材の回転子軸方向 1 端面に設けられ、コイルの渡り線が収納される円周方向に伸びた渡り線収納部とを備えた電動機の固定子において、前記渡り線収納部のコイル側側壁に、コイルの巻き始めの巻線端末を導入する切欠きであってその深さが少なくとも鉄心歯部の取付部まである切欠きが設けられていることを特徴とする。

【0009】上記手段によれば、最初に配線せられる巻き始めの巻線端末が、コイルの巻き始めの巻線端末を導入する切欠きから導入されるので、2 ターン目以降の電線は、巻き始めの巻線端末に直接接触することなく巻回することが可能となり、請求項 1、2 に記載の手段と同様に、巻線時の機械的な接触や運転時の振動などによって電線の絶縁被覆が破られたりする恐れがなくなる。

【0010】

【発明の実施の形態】以下、本発明の実施例を図 1 乃至

図7に基づいて詳細に説明する。なお、実施例においては、本発明をアウターロータ形直流ブラシレスモータの固定子に適用した例を示すが、これに限定されるものではなく、鉄心歯部にコイルが集中巻きされる形状の他の電動機に適用可能なことは言うまでもない。

【0011】図5に示されるのは、本アウターロータ形ブラシレスモータの固定子10の全体構成を示す平面図である。本例の場合、3相、36スロット、24極の構成であり、図示しないが、固定子10の外周には24極の永久磁石を固定子10に対向する向きに配設せられた回転子があって、固定子10と一対になって、アウターロータ形ブラシレスモータを構成している。

【0012】図5および図5のA-A断面図である図6に示すように、固定子鉄心は、円環状の鉄心ヨーク部20bと鉄心ヨーク部20bから径方向外方に複数個突設された鉄心歯部20aからなり、打抜加工せられた珪素鋼板の薄板を積層して形成せられている。更に、固定子鉄心は、鉄心歯部20aの外周面を除いたほぼ全面を、例えばインサート成型により形成せられた絶縁樹脂製の被覆部材30により覆われた構造となっている。

【0013】コイル40は、U、V、Wの3相コイルが、本実施例の場合、それぞれ12組に分割されて、この被覆部材30の上から各鉄心歯部20aに巻回され、それらが渡り線50で直列に接続されて全体の3相巻線を構成している。

【0014】図1は本発明の第1の実施例の要部を示す斜視図。図2はその巻線実装前の状態を示す図である。図に示すように、本実施例の場合では、コイル内径側のスペースに円周方向の溝状スペースである渡り線収納部60があり、各相の渡り線50はこの渡り線収納部60の中を経由して次組のコイルへと至る。図に示すように、渡り線収納部60を経由してきた渡り線50は、渡り線収納部のコイル側側壁100から巻線端末70として導入されるが、その導入位置から鉄心歯部20aの鉄心ヨーク20bへの突設基部にあたる鉄心歯部取付部までの間の側壁100の表面には巻線端末収納溝80が設けられており、巻線端末70はこの巻線収納溝80の中を配線せられて鉄心歯部20aに至り、次に鉄心歯部20aの被覆部材上に巻回されてコイル40を形成する。このように、巻き始めの巻線端末70が巻線端末収納溝80の中に収納されて配線されるので、2ターン目以降の電線は、巻き始めの巻線端末70に直接接触することなく巻回することが可能となり、巻線時の機械的な接触や運転時の振動などにより電線の絶縁被覆が破られたりする恐れがなくなる。

【0015】なお、本実施例の場合、巻線端末収納溝80の断面は矩形形状のものを示しているが、この断面形状は半円形、楕円型など電線を収容できるものであれば形状を問わない。また、この収納溝の溝幅は巻線端末の電線幅の1.2～5倍程度、溝深さは巻線端末の電線厚

さの1.2～2倍程度であることが望ましい。

【0016】図3は本発明の第2の実施例の要部を示す斜視図。図3はその巻線実装前の状態を示す図である。図に示すように、渡り線収納部60を経由してきた渡り線50は、渡り線収納部のコイル側側壁100から巻線端末70として導入されるが、この渡り線収納部のコイル側側壁100には、切り欠き深さが少なくとも鉄心歯部20aの取付部まである切欠き90が設けられているため、巻線端末70は渡り線収納部60からこの切欠き90を経て直接鉄心歯部取付部に至り、鉄心歯部20aの被覆部材上に巻回されてコイル40を形成する。このように、巻き始めの巻線端末70が切欠き90から導入されるので、2ターン目以降の電線は、巻き始めの巻線端末70に直接接触することなく巻回することが可能となり、巻線時の機械的な接触や運転時の振動などによって電線の絶縁被覆が破られたりする恐れがなくなる。

【0017】なお、この切欠きの切欠き幅は巻線端末の電線幅の1.2～5倍程度であることが望ましい。

【0018】

【発明の効果】以上のように、本発明によれば、絶縁樹脂製の被覆部材で覆われた固定子鉄心の被覆部材部の構成と巻線端末の配線方法に簡単な工夫を加えることによって、コイルの巻き始めの巻線端末と接触することなく2ターン目以降の電線を巻回することが可能になるので、低価格でしかも絶縁信頼性の高い電動機の固定子を提供することが出来る。

【図面の簡単な説明】

【図1】本発明の第1の実施例の要部を示す斜視図

【図2】本発明の第1の実施例の要部を示す斜視図（巻線実装前）

【図3】本発明の第2の実施例の要部を示す斜視図

【図4】本発明の第2の実施例の要部を示す斜視図（巻線実装前）

【図5】本発明における直流ブラシレスモータの固定子の平面図

【図6】図5のA-A断面図

【図7】本発明の第1の実施例における巻線実装前の固定子の部分上面図

【図8】従来の技術における巻線端末の配線構成を示す斜視図

【符号の説明】

10：固定子

20a：鉄心歯部

20b：鉄心ヨーク部

30：絶縁樹脂製の被覆部材

40：コイル

50：渡り線

60：渡り線収納部

70：巻線端末

80：巻線端末収納溝

(4)

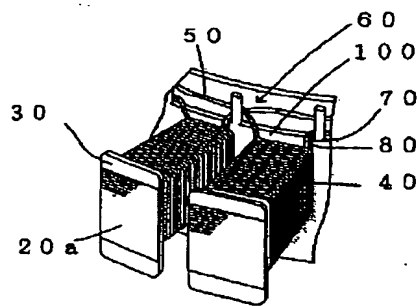
特開2003-219593

6

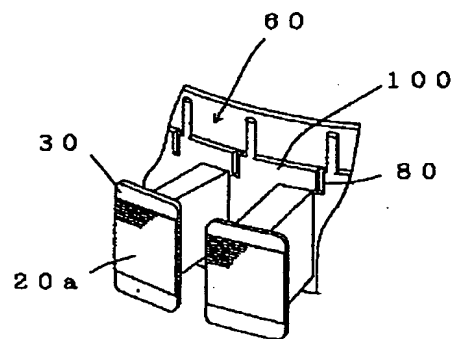
5
90: 巻線末端を導入する切欠き

* * 100: 渡り線収納部のコイル側側壁

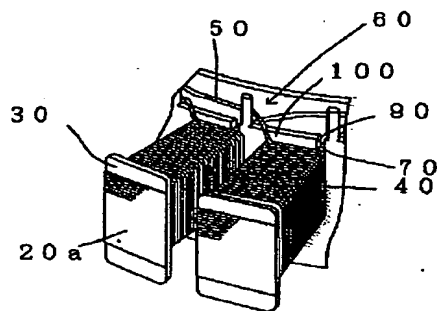
【図1】



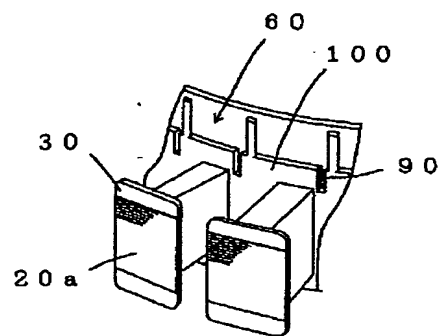
【図2】



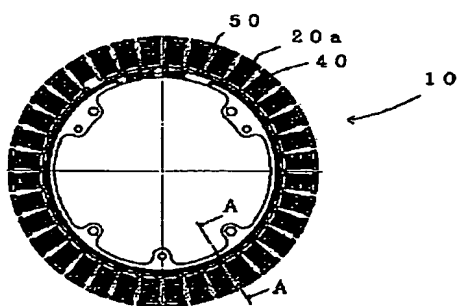
【図3】



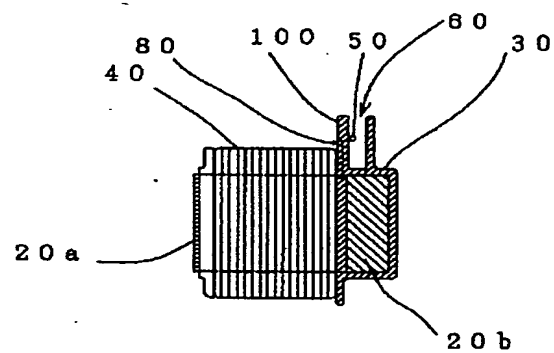
【図4】



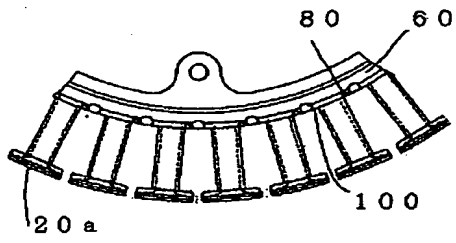
【図5】



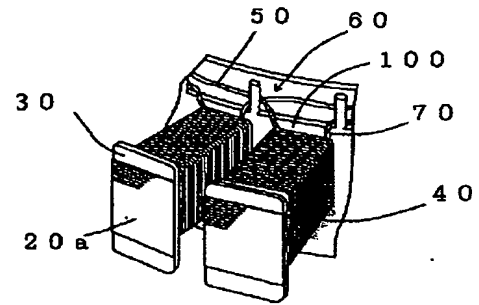
【図6】



【図7】



【図8】



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